10366

ACTION DESCRIPTION MEMORANDUM
FOR
SOLAR EVAPORATION PONDS CLOSURE

Rockwell International
Aerospace Operations
Rocky Flats Plant

Operating Contractor

U.S. Department of Energy
Rocky Flats Area Office

DRAFT
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1.0 PROPOSED SOLAR PONDS CLOSURE

The action proposed by the U.S. Department of Energy (DOE) involves the closure of the solar evaporation ponds at Rocky Flats Plant (Rocky Flats), which are an interim status unit under the Resource Conservation and Recovery Act (RCRA). The facilities included in the solar pond closure include five Solid Waste Management Units (SWMUs). These are:

SWMU#		Description
101	-	207 solar evaporation ponds
121	-	Original process waste lines (within the project boundary)
138	-	Cooling tower blowdown - Building 779
149	-	Effluent pipe
150.8	-	Radioactive liquid leaks northeast of Building 779

Closure activities will be conducted in accordance with all applicable NEPA regulations (DOE, 1981, 1988).

1.1 OBJECTIVES OF SOLAR PONDS CLOSURE

Closure of the solar ponds will meet the performance standard of 6 CCR 1007-3, Section 265.111. The objectives of these standards require that closure be accomplished in a manner that:

- minimizes the need for further maintenance, and

- controls, minimizes or eliminates, to the extent necessary to protect human health and environment, post-closure escape of hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or to the atmosphere.

The proposed closure activities for the solar ponds will also comply with long-term monitoring and groundwater corrective action requirements of 6 CCR 1007-3, Section 264 Subpart F. The actions proposed for closure include a variety of techniques that will provide for contaminant source removal and/or stabilization. The proposed actions are based on meeting closure performance standards for the removal of pond liners, pond embankment soils, and in-place soils beneath the ponds. The standards are based on transuranic radioactivity standards and the definition of hazardous waste intended to provide long term protection to exposed persons in a "critical segment of the general population."

1.2 BACKGROUND

The Solar Ponds consist of a series of five evaporation ponds that were used to store and treat liquid process wastes having less than 100,000 pCi/l total long-lived alpha activity (DOE, 1980). These process wastes also contained high nitrates and treated acidic wastes containing aluminum hydroxide. The ponds are also known to have received other wastes including sanitary sewage sludge, lithium chloride, lithium metal, sodium nitrate, ferric chloride, sulfuric acid, ammonium persulfates, hydrochloric acid, nitric acid, hexavalent chromium, and cyanide solutions (Rockwell International, 1988).

The original solar pond consisted of a clay-lined impoundment constructed in 1953 and operated until 1956. The pond had a maximum of two containments. This facility was removed in 1970

when Pond 207-C was constructed. Pond 207-A was placed into service in 1956. Ponds 207-B, North, Central, and South were placed in service in 1960.

The ponds were originally lined with asphalt planking. These linings have been modified because of cracking, slumping, and leakage of pond contents. Repairs on these ponds have been effected at various times over the years. The repairs generally included replacing or covering the asphalt planking with asphaltic concrete.

Subsequent construction activities included the installation of interception trenches and a french drain system to prevent natural seepage and pond leakage from entering North Walnut Creek. This system has been replaced by the current french drain system, which was installed in 1981.

Sludges from these ponds have been removed from time to time to implement repair work on the ponds. These sludges are mixed with portland cement and calcium chloride and packaged as a mixture of sludge and concrete (pond crete) for shipping to an off-site low level radioactive waste disposal site.

Emplacement of process waste material into these ponds ceased in 1986. The ongoing activities are the evaporation of the liquids being held, the removal and solidification of pond sludge, and site monitoring and characterization activities. The 207-B ponds continue to be used to store intercepted seepage water collected by the french drain system.

1.3 NEED FOR ACTION

Changes in the Rocky Flats Plant process waste treatment operations no longer require the use of the solar evaporation pond facilities

for waste treatment. As a result they are being closed under interim status closure requirements of 6 CCR 1007-3 Section 265 and 40 CFR 265, Subpart G.

Hydrogeologic site characterization studies in the vicinity of the solar ponds have shown that they are a source of contamination of alluvial groundwater migrating northward to the North Walnut Creek drainage. The current french drain system does not appear to completely contain the contaminated groundwater flow from the ponds.

1.4 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The activities necessary to complete closure and comply with the groundwater corrective action requirements of 6 CCR 1007-3, Section 264, Subpart F include the following elements:

- o dewatering of impoundments;
- o removing, treating, and disposing of the pond sludges and sediments;
- o removing, treating, and disposing the equipment used at the solar ponds; and
- o reclamation.

1.4.1 Dewatering of Impoundments

The critical activity for closure of the solar ponds is removal/ evaporation/ treatment of the liquid currently held in the solar ponds and the disposition of incoming water from the french drain system. To date, dewatering has taken place principally through natural evaporation in conjunction with limited forced evaporation.

The forced evaporator, located in Building 374, is currently used for treated process waste at the Plant. However, additional capacity is available on a part-time basis for solar pond water and intercepted water from the french drain system.

Natural and forced evaporation will remove all free liquids from the ponds; therefore, no liquids will remain for treatment and disposal.

1.4.2 Removal, Treatment, and Disposal of Wastes, Liners, Soils, and Groundwater

1) Waste Sludges and Sediment

The sludge and sediments in the ponds will be solidified for disposal. These waste solids will be mixed with cement to form pond crete blocks suitable for shipment for off-site disposal. Solidifying pond sludges and sediments into pond crete has been previously used at Rocky Flats Plant and has proven to be effective. This material meets the requirements of the Department of Transportation (DOT) regulations for shipping, and the material meets the requirements of the Nevada Test Site for solidification of radioactive waste. It is estimated that the total volume of sludges and sediments to be solidified will be about 3,125 cubic yards.

2) Liners and Soils

It is estimated that the solar ponds contain approximately 11,000 cubic yards of liner materials which may require removal. Contaminated pond liners and soil (including embankment soil) will be removed in accordance with performance standards for closure based on radioactivity of plutonium and americium. These standards are based on a soil screening level of 0.2 microcuries of transuranics

per square meter in the upper 1 centimeter of soil. A soil sampling analysis program will be implemented prior to liner and soil removal to evaluate the areas that will require removal. The removed materials will undergo a volume reduction, if necessary, via a portable crusher and packaged for off-site disposal at the Nevada Test Site or other approved facility as a mixed hazardous and radioactive waste. Liner materials which will not be removed from the site will be reduced in size to pieces not greater than 12 inches.

The extent of removal of the embankment soils will be based on the soil sampling program and comparison with the permissible contaminant levels. It is assumed that about 2,700 cubic yards of embankment soils will require removal. These soils, depending on their soil characteristics, may be shipped to the Nevada Test Site, on other approved disposal facility.

Potentially contaminated soils underlying the pond liners will be evaluated as part of the overall soil sampling and analysis program. Soils exceeding the performance standards may be removed and packaged for off-site disposal.

On-site treatment of contaminated soils is being considered as an alternative to removal and off-site disposal. Potential soil treatment procedures are currently being evaluated, and if selected, implementation will begin in January 1991.

3) Groundwater

Groundwater in the hillside north of the solar ponds will be collected and treated. The existing french drain system will collect the groundwater north of the perimeter security zone. Improvements and other upgrades to this system are currently being evaluated to improve the collection efficiency of contaminated

groundwater. If improvements are found necessary, implementation will begin immediately. An interceptor drain will be installed downgradient of the toe of the final cover to intercept groundwater flows directly north of the solar ponds. The evaporative treatment method presently utilized at the Plant will most likely be used for treating this water. The collected groundwater will be pumped from the interceptor and french drain systems to the solar ponds and the forced evaporation system. Eventually, the collected water may be treated in a facility constructed for area-wide groundwater corrective action. This treatment unit is tentatively scheduled for completion in November 1991.

1.4.3 Removing, Treating, and Disposing of Equipment Used at the Solar Ponds

All auxiliary and construction equipment used to support closure activities of the solar ponds will be decontaminated as required by 6 CCR 1007-3, Section 265.112(b)(4) and 265.114 or managed as a waste material. The wastes generated may include soils, debris, and free liquids. Representative samples of these wastes will be analyzed and the material handled appropriately based on the results of the analysis. If these wastes qualify as mixed waste, they will be shipped off-site to an approved treatment or disposal facility.

1.4.4 Reclamation

The solar ponds will be closed with some wastes remaining in place, meeting 6 CCR 1007-3, Section 265.228(c). The ground surface will be graded to minimize surface water infiltration and control erosion from runoff. A final cover will then be placed to meet the performance standards in Sections 265.228 and 265.310. This final cover will be designed and constructed to:

- provide long term minimization of the migration of liquids through the closed impoundment;
- function with minimum maintenance;
- promote drainage and minimize erosion or abrasion of the cover;
- accommodate settling and subsidence so that the cover integrity is maintained; and
- have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

The cover will be stabilized to decrease erosion by wind and water, thereby contributing to the development of a stable surface environment. This will be accomplished by establishing a vegetative cover.

1.4.5 Alternative Actions

The proposed action for closure of the solar evaporation ponds is based on the results of the site characterization activities. Studies are ongoing to evaluate alternate actions that would prove to be economical and protective of human health and the environment. Alternatives include:

- in-situ treatment of contaminated soils
- in-situ stabilization of sludges and sediments
- complete removal of liner and embankment soils

- on-site treatment and/or disposal of removed contaminated materials
- in-situ groundwater treatment
- other currently unidentified technologies

Should the No Action alternative be implemented, a variety of environmental consequences could result. These might include:

- local long term impact to water quality
- long term impact to off-site water quality
- continued contaminant migration as a result of infiltration and inflow of groundwater
- potential impacts of natural phenomena such as flooding, earthquakes, and tornadoes

2.0 LOCATION OF ACTION

The Rocky Flats Plant is located in northern Jefferson County approximately 16 miles northwest of downtown Denver, Colorado. The immediate area around the Plant is primarily agricultural or undeveloped land. Other population centers within 12 miles of the facility include the cities of Boulder, Broomfield, Golden, and Arvada. A detailed description of the local demographics and environment is presented in the Rocky Flats Plant Site Final Environmental Impact Statement (DOE, 1980).

The solar ponds are located in the central portion of the Plant inside, and near the Perimeter Security Zone (PSZ). The ponds and immediate vicinity represent the primary location for any closure

activities undertaken. Activities associated with closure of the ponds will occur totally within the Plant boundaries (except for off-site shipment of wastes) and will be controlled by appropriate facility procedures in compliance with appropriate environmental regulations.

3.0 ENVIRONMENTAL ISSUES

Closure of the solar evaporation ponds will involve a variety of activities designed to remove, contain, or otherwise reduce potential and actual contamination sources from a designated solid waste management unit. The actions proposed for closure are, in fact, mitigative measures to insure that human health and the environment are protected.

The activities to be undertaken for closure will, in and of themselves, cause short term environmental impacts. These activities include construction-related operations such as digging, trenching, grading, and capping. Waste removal and treatment operations include digging, pumping, processing, crushing, and transportation. All these activities will have some, temporary, effects on various environmental elements. These effects are summarized below.

3.1 ENVIRONMENTAL EFFECTS

3.1.1 Air Quality

Air quality could be temporarily impacted as a result of the closure actions. Increased airborne particulates may result from the construction operations because of potentially dusty operations due to soil excavation and truck hauling. The excavation of sludge, sediment, liner, and soil could result in the release of volatiles to the atmosphere.

The environmental impacts of volatilization of constituents to the atmosphere is considered to be negligible. Suspension of particulates to the atmosphere will be controlled to the extent necessary through dust suppression techniques, monitored through ambient air monitoring to ensure adequate control measures are being taken, and have little environmental impact.

3.1.2 Water Quality

The closure activities will have a net beneficial effect on groundwater quality in that the sources of contamination will be removed. Contaminated groundwater flowing through the site will be intercepted and collected for evaporation, and the major sources of contamination removed. It is unlikely that groundwater quality would be further degraded during the closure activities.

Surface water quality could be temporarily impacted during closure activities. Heavy precipitation during construction could result in increased runoff of sediments and washing of newly exposed liner and soil. Proper surface drainage control and the temporary installation of containment structures will minimize surface erosion and transport to North Walnut Creek.

3.1.3 Soils

Negligible impacts to the soils on-site will occur because of regrading and redistribution of previously disturbed, stockpiled soil. Low to moderate impacts will result if soil removal below the pond liners is required. Erosion of the soil, prior to vegetative cover establishment, is expected to be low.

3.1.4 Cultural Resources

Closure activities will have no impact on archaeological and/or historic resources. The State Office of Archaeology and Historic Preservation has stated that the areas within the 384-acre security-fenced zone are so highly disturbed that little cultural resource information would be available. A class II survey was conducted during the summer of 1988 on the remainder of the 6200-acre plant site, and no unique sites or sites considered eligible for nomination to the National Register of Historic Places were discovered (Burney and Associates, 1988).

3.1.5 Biological Resources

This closure activity will have negligible impacts on vegetation as the area is filled and prepared for cap placement and runon/runoff controls. Vegetation is relatively limited around the project area.

The U.S. Fish and Wildlife Service has listed two endangered species as potentially existing in the Rocky Flats area. These species are the black-footed ferret and the bald eagle. This project will not affect either species.

3.1.6 Land Use

Closure will require a small amount of additional land to establish the final cap over the pond area, resulting in a low impact to vegetation and soils adjacent to the site. The activities are within existing Plant boundaries and will not adversely impact agricultural areas or recreation areas. Closure will tend to enhance the local environment and limit potential adverse environmental effects from contaminant migration off-site to agricultural areas or population centers.

3.1.7 Wetlands

The solar ponds site does not occupy wetland habitat; therefore closure will have no effect on wetland resources.

3.2 HEALTH AND SAFETY

Solar Ponds closure actions will conform to all applicable health, safety, and environmental requirements. The Plant maintains an on-going environmental surveillance program as required by DOE orders. Monitoring and sampling locations will be augmented to ensure compliance with environmental requirements for the remedial actions taken. Major environmental issues include:

1) Occupational Exposure - Buried waste site improvements and/or contaminated waste treatment will result in occupational exposure to toxic substances and possibly to trace amounts of radioactive materials. Appropriate field operations and waste-handling procedures will be implemented to minimize this exposure.

2) Nonoccupational Exposure - Implementing actions will be directed towards preventing potential exposure to the public from contaminants which have the potential to migrate beyond site boundaries. Construction activities will be managed to limit airborne contaminants resulting from excavation work and any waste processing effluents will be controlled in accordance with existing facility policies and environmental requirements.

3) On-site Transportation - Any on-site transportation of waste will be by truck. Impacts other than those

normally incident to transportation (e.g., pollution, potential for injuries or fatalities), include the potential for occupational exposure to toxic substances. On-site transportation activities will be managed to minimize attendant occupational risks. There is essentially no hazard to the public health since the subject transportation activities will occur within Plant boundaries.

4) Off-site transportation of pond wastes will provide an incremental contribution to health effects which are normally incident to transportation, and will affect the general public. These risks include the effects of pollutants associated with general transportation and the potential risks associated with transportation-related accidents. Risk assessments associated with transport of radioactive materials have shown that radiological risks are significantly less than risks associated with transportation of nonradioactive materials.

5) Accidents and Natural Phenomena - The potential exists for occupational and nonoccupational impacts to occur from equipment failures and operator errors as well as from natural phenomena (e.g., tornado, high winds, heavy rainfall). Such events are expected to have a very low frequency of occurrence.

6) Long-Term Environmental Quality - There are several individual issues associated with contamination treatment and confinement actions. Associated with both closure categories is the establishment of appropriate surveillance and reporting practices. This includes monitoring well placement, frequency

and method of sampling, and duration of sampling. Also of issue are potential impacts from intrusive actions by burrowing animals and vegetation. Waste management operations will perform periodic inspections and repairs to mitigate such occurrences. Confinement alternatives raise the issue of loss of institutional control and potential impacts from subsequent intrusion by man.

Groundwater at the solar ponds is monitored quarterly by monitoring wells in order to protect human health and the environment from contamination originating from the ponds. The monitoring and security measures (fencing, security patrols, and camera surveillance) are designed to protect human health from the threats posed by the Plant and its operations as a whole, as well as from threats posed by the solar ponds.

4.0 REFERENCES

Burney and Associates. 1988. Cultural Resources Inventory, Rocky Flats Plant Site. Draft Report.

Rockwell International. 1988. Solar Evaporation Ponds Closure Plan.

U.S. Department of Energy. 1980. Rocky Flats Plant Site, Final Environmental Impact Statement, DOE/EIS-0065.

_____. 1981. Environmental Compliance Guide. U.S. Department of Energy, Washington, D.C.

_____. 1988. NEPA Compliance Regulations. 10 CFR Part 1021. Office of Federal Register, National Archives and Records Administration. Washington, D.C.